

# Effects of Nutrient Deficiency on Antioxidative Enzymes in Rice

Moon Hee Park, Jeong-Hyun Lim, Myung Ryul Park, Kyeong-Gu Choi, Song Joong Yun\*  
Chonbuk National University, Jeonju 561-756, Korea

## Objectives

Antioxidant enzymes are involved in the various biotic and abiotic stress responses. In this study, we investigated the responses of antioxidant enzymes to the deficiency of mineral nutrients in rice.

## Materials and Methods

- **Plant materials:** Rice (cv. Dasan) seedlings.
- **Solution culture:** Yoshida solution was used.
- **Nutrient deficiency treatments:** Seedlings at the fourth leaf stage were treated with the solution deprived of each element of N, P, K, Ca, or Fe for 7 days.
- **Enzyme assays:** Activities and isozyme profiles of antioxidant enzymes [CAT (catalase), POX (peroxidase), APX (ascorbate peroxidase), GR (glutathione reductase), SOD (superoxide dismutase)] were determined.

## Results and Discussions

Activities and isozyme profiles of antioxidant enzymes showed a tissue specificity. The levels of activities were higher in roots than leaves in all the enzymes except APX. Antioxidant enzymes responded to the nutrient deficiency in a enzyme- and nutrient-specific manner. Activity of catalases was increased by the deficiency of either N, P, or both in leaves. In roots, the activity was increased by the deficiency of either P, K, or both, but decreased by the deficiency of N, Ca, or Fe.

This research was supported by a grant (CG3214) from Crop Functional Genomics Center of the 21st Century Frontier Research Program funded by the Ministry of Science and Technology(MOST) and Rural Development Administration(RDA) of Republic of Korea.

---

\* Corresponding author: TEL: 063-270-2508

E-mail: sjyun@moak.chonbuk.ac.kr

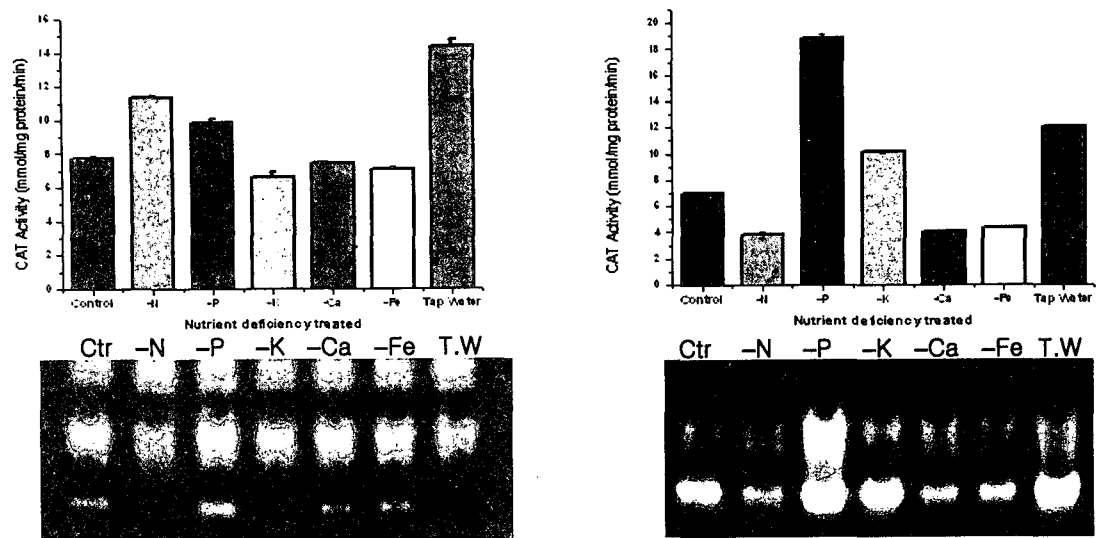


Fig. 1. Effects of nutrient deficiency on CAT activity and isozyme profiles in leaves (A) or roots (B). Ctr, control; TW, tap water.